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ABSTRACT

Evaluative comments from one participant in the June 1976 Pittsburgh conference on the theory and practice of beginning reading are presented in this paper. Discussion centers on curriculum analyses, testing practices, teaching practices, units of analysis that are required for reading research, learning characteristics, stages of reading acquisition, and the need for more field research in the classroom. Audience response following the presentation of the paper is included. (RL)

Observations on Research and Practice in Beginning Reading

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OBSERVATIONS ON RESEARCH AND PRACTICE IN BEGINNING READING

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My predominant impression of the set of three conferences is illustrated by the observation that when people spoke on basic research, the conversation generally tended to be around the question, "Well, what does it mean for practice?" When someone talked about applied works and built a practical program and showed that it worked to some degree, as Wallach did, the question was, "Well, why does it work? You really haven't explained why it works." In the discussions at the conferences, there was a consistent press to probe our ignorance no matter from what kind of work it came. In my brief remarks, I will try to both counteract and contribute to this focus on what we do not know.

What I will do is interject myself between the conferences and those individuals who are writing integrative summaries of the conference proceedings in order to encourage them to say the "right" things--"right" being defined as being in agreement with me. I will comment on

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what I consider have been the main thrusts of the conference, then mention some of the implications and next steps that I would like to see the summarizers discuss in their papers. Because of the shortage of time, I shall be dogmatic and offer little appropriate qualification to my remarks.

Using What We Know

The predominant focus of all of the conferences was experimental and practical work concerned with the basic skills of reading. The experimental work included investigations of letter discrimination, orthographic regularities, phoneme identification, acoustical analysis, mapping sound to print, and orthography and phonics training. At more complex levels, the work reported considered the transition from elementary units to context effects, lexical access, and the relationships between decoding and comprehension. In the more practical papers on the construction and use of reading programs and analyses of completed and published programs, the bulk of the papers were concerned with the development of the early basic skills of reading.

The implication of this concentration of effort on beginning reading presents a charge to the future. We appear to know quite a bit about these basic skills, and although we have explanatory debates about how they work, and our theory and knowledge is not exact, it is high time for us to shift our activity from an emphasis on descriptive research concerned with explaining how things work to normative research concerned with making things work. In other words, we must turn to the

design, prescription, and optimization of learning and instructional procedures. For example, I would really like to see LaBerge do some optimizing work on the transition problem. He should not only try to understand the phenomenon, but also try to produce it. Trying to produce it will also facilitate the understanding of it. My point is that we now can say that we know a lot about the processes of beginning reading, and while our theory and knowledge is not exact, we are ready to devote some time to a new kind of work that uses this knowledge. For laboratory scientists, this change in emphasis requires a change in motivation and prestige values. We cannot only say, as Gregg and Farnham-Diggory say, that we are going to continue to do simulation modeling because it has paid off in the past for our theoretical work; and we cannot say, as many of the speakers in these conferences have said: "My real objective in making this talk is to develop new hypotheses for experimentation."

Our new work should be driven by the tactics of optimization-oriented, prescriptive research. This work, as Trabasso pointed out, is generated by a different problem base--a base not convenient only for theory, but for other applications as well. While we are about this new task, we undoubtedly will improve our descriptive theories. But given the overwhelming amount of knowledge that has come up in these conferences and is now available in the literature on the basic skills of reading, successful attempts at instructional research in the context of prescriptive science can now begin.

In this prescriptive enterprise, we should try to get away from the attitude of my former garage mechanic. When I went to this garage mechanic and said "What is wrong with my car and what does it need?", he would say, "Well, you know how a carburetor works," and then he would start to tell me about all of the things he knew about how a carburetor works. He would say, "It grows a semantic net," or something like that. All the while, what I wanted to know was what was his prescription for fixing my car.

As we get into instructional, prescriptive experimentation in the laboratory, we also need to get into it in the school system. Serious attention to the management and design of school and classroom structures is necessary in order to really insure that what we know about teaching decoding and acoustical processing is implemented appropriately. We should not be in the position of saying that our ideas were not understood, or there were not good criteria imposed on student performance. Attention to the school situation and partnership with educators is required in order for us to know that what can occur does occur.

I am certainly not talking about abandoning basic research, but I am suggesting a shift in tactic given what we know. We do not have large engineering resources in psychology and education--the large engineering research component that other fields have. We have to attend to this aspect ourselves, at least for the time being. Thus, I strongly recommend that we capitalize on what we have learned in the area of basic skills of beginning reading. We will, of course, discover

limitations, and there will be changes in our knowledge. As we work on these basic decoding skills which appear to help children learn, we should be careful to understand what the limitations are. We do know something, however, and we ought to use it now. If we do, then the next 10 years are going to be characterized by prescriptive research on these basic skills and the increasing effectiveness of teaching them in the schools. And while this goes on, new investigations in cognitive psychology, artificial intelligence, and knowledge structures and so forth, will be coming along behind the scene and further add to our knowledge.

At these conferences, there has been less research reported on higher or other level aspects of reading comprehension. They should not be considered hierarchical because one begins to learn more complex reading skills while one learns decoding. Nevertheless, there were few papers on discourse processing, inferencing, or reasoning from text. In these areas, theoretical debate is going on, as witnessed in the papers by Gregg and Farnham-Diggory, Frederikson and Smith, Perfetti and Lesgold, and LaBerge. The implication for future work is that this kind of research has to be pushed in the usual descriptive research tradition.

We now have some tools and some promissory notes for interesting investigations from developmental psychology and information processing which possibly have very significant implications. The knowledge we will gain from this new research will eventually change the kind of

prescriptive research that we are going to start now. But I still must emphasize that we have to use the knowledge we presently have because it is going to be helpful to children learning to read now, and the new theory and research will not for some time. I do not think that as a result there is going to be an undue emphasis on decoding; teachers will see to that.

In sum, what the conferences emphasized was the need for prescriptive research based on what we know now and the continuation of research to produce new knowledge. I will now comment on some of the major themes in reading research and practice that emerged in this set of conferences.

Physiological Research and Clinical Investigations

There have been a few papers in these conferences on physiological functioning and biological structures. Fisher's paper on visual periphery dysfunction indicated that this kind of dysfunction precludes eye movements of long durations and affects reading. Mackworth described brain hemisphere dominance and physiological measurement through eye movements. Johnson reviewed brain damage and clinical research. These studies recommend two kinds of research--laboratory research and a serious look at clinical work. This research can be viewed as a corrective element to ramp[illegible] cognitive theorizing by providing parameters based on structural limitations and functioning.

Curriculum Analysis

The designers of these sets of conferences cleverly put in the very interesting venture on curriculum program analysis, and we had three contrasts. Popp contrasted two programs--one with an "initial meaning" emphasis, and one with an "initial decoding" emphasis. Beck and Block talked about two programs--contrasting their use of phonic instruction. Bartlett also talked about two curricula, and offered the very interesting observation that the "meaning curricula" tended to be for rich kids, and the "decoding curricula" tended to be for disadvanted kids, and she speculated on the implications of this.

These detailed analyses are useful for a number of reasons. First, they give the teacher more detailed information about the nature and reasoning behind an instructional program than is ever given in the short descriptions that are written in teachers' curriculum manuals. In addition to providing teachers with this information, they also give them a choice, if indeed they have a choice, of selecting programs on a more rational basis than is usually possible. Second, these curriculum analyses also give researchers ideas for studies. Knowing how these programs were designed and displaying their characteristics raise questions regarding why they work and why they do not work. Curriculum analyses begin to dissect global program ideas and if these ideas can be filtered down into manageable studies, questions regarding why they work can begin to be answered.

Analysis of components of a program also gives teachers an idea of how to flexibly use the program; it allows teachers to break out of the inflexibility of total program approaches which locks them into a series. I hope that the description of the details of various kinds of programs starts a trend for programs that have more flexible components. If programs were described in a way so that we knew their components, and built in a way so that they were less monolithic, then they could be more flexibly and adaptably used to accommodate different children. (Glaser, in press).

I have another comment related to curriculum program analysis which is directed to Williams. Trabasso commended her for trying to look at the rules of psychological knowledge, and then attempting to build them into her program. And Williams kept saying, "Well, as I did these things, I had to ignore psychological rules, cast them aside, or modify them." I do not think psychological knowledge is to be looked at in that way. What one must do with psychological principles is to understand them on a heuristic level, and then impose what one knows in an artistic way. A program is being designed, and programs that are built solely from an algorithmic interpretation of principles are awfully dull. A program designer has to take principles and bend and twist them or throw them out. And that is the artistry of building a program and is something to be proud of, not something about which to say, "I am not using psychology very well."

Testing Practices

A paper by Calfee emphasized the careful training of teachers in the use and interpretation of testing instruments, and the development of more useful kinds of testing instruments in the teaching of reading and reading comprehension. A number of issues are important in considering future directions in this work. One is that testing and teaching are part of the same enterprise; they are not different entities. We tend to think of tests as "outside" evaluation devices, and not as sources for information required for teaching. Students should conceive of this information as being valuable for themselves as well as for the teachers. Testing and teaching are part of the same system, and should be attitudinally conceived so, and so built.

Another issue of importance is that there is a need for tests on the details of high-level discourse processing skills. This is a research task. There has been a need expressed, throughout the third conference and the others, that teachers want to know where the child is coming from. As you teach a child who has difficulty learning, a major frustration is how to get this child to advance. There is a need for information. What should I know about this child in order to be able to teach appropriately? The need is expressed for tests that give us much more information about language capabilities, about letter discrimination, acoustical abilities, and, in general, some kind of a breakout of generalized readiness and aptitude-like skills.

In order to meet these needs, in undertaking test design work for instruction, we should consider analyzing readiness and aptitude-like processes using cognitive psychology notions. Research is now being carried out that attempts to analyze school tasks, such as reading, in terms of the demands that these tasks place on the child's memory, perceptual abilities, and capabilities for new learning. If the cognitive processes that underlie these task demands can be identified, information might be provided that can be used as a basis for instructional decisions. For effective instruction, characterization and diagnosis of the capabilities of the learner must be made in terms that are relevant to educational decision making. Tests given only at the beginning of a period of schooling are not enough; a more continuous process is required. It is necessary to describe changes in the learner's capabilities as instruction progresses and to consider this updated description of abilities in making decisions as to the course of successive instruction.

Teaching Practice

In a number of papers, (Clay, Smith and Natalicio) the authors said essentially that teachers need to hang loose and need to proceed from what children know. The implication of this statement is that schools should be capable of adapting readily to the progress of children. Some work is required for enhancing the school and the teacher's capability to do this.

One thing that I hope can come out of these conferences is a set of heuristics for teachers about teaching reading. Teachers need some kind of a theory, not only rules. What I mean by this has been discussed by Broudy (1972). He observes that, like many other large [redacted] school systems and the teachers in them tend to live by rules that are supposed to take care of standard cases, with only slight adjustments allowed for departures from standard cases. There are, for example, rules that organize the educational continuum into grades, and for each grade, there are prescriptions concerning the kinds of information and skills to be covered in the course of the school year. There are also rules about the logistics of living in the school environment that pertain to attendance, time periods, and movement through the building. Of course, no complex system can do without certain accepted rules of conduct. What is important to observe, however, is not just the presence of rules, but a preoccupation with rules and standard procedures. There is an imbalance between a system of rules and a set of heuristic principles--principles which can provide general guides to action and free teachers from the narrow specificity of standard operating procedures. Workbooks, manuals, and other materials for teachers frequently display "cookbooky" formats that indicate a belief by the authors and an expectation by teachers that teachers need specific, standard operating procedures that cover most anticipated events in the classroom. Excessively rule-ridden operations and practices attest to a lack of professionalism. Broudy points out that frequently the teacher's autonomy is restricted to

trivialities; a teacher is expected to make only minor adaptations in a program of study, in instructional procedures, or in teaching style.

Now, I am sure this is not uniformly true, but it is reported that it is frequently an attitude, and I would like to see whether we can derive from these conferences a set of heuristics about teaching the basic skills of reading, and communicate this theory to teachers. For this purpose, one cannot parrot the kinds of theory and findings that are found in the usual educational psychology course or practices of reading. Information is required about reading theories--how decoding works and what influences it, the consequences of an overemphasis on decoding, and the effects of stage developments--so that teachers can have a set of heuristics upon which to base good judgments on how to use their curricula and make sensible instructional decisions. A theory for teachers would be a fascinating thing to emerge, insofar as possible, from all of the brains and energy that went into these conferences and all of the reports there have been on practical and experimental developments.

Units of Analysis in Research

My next point is concerned with a research question that needs to be carefully defined. I am interested in something called the unit of analysis that will have the best payoff in our research on reading. The unit of analysis I want to identify is neither the micro analysis of many theory elaboration experiments nor the variables observed in large outcome studies of program effects. I am talking about

some mid-level investigation, some skill units of competent stages, something like oral reading that Danks and Fears investigated, and something like the skill levels that my Carnegie-Mellon University colleagues study in chess (Simon & Chase, 1973). Possibly it is at the contextual unit level, or maybe it is the kind of units that Resnick, Suppes, and Groen talk about when they study addition problems (Resnick, 1976; Suppes & Groen, 1967).

Mid-level analyses are not carried out in terms of the details of short-term memory processing, but in terms of the importance of the knowledge base that has to be held in memory. From this level of analysis, if regularities can be shown, one can reduce to more micro theories, but also then move to instructional theories. Out of this conference I think can emerge some definition of the level of analysis which is a unit of proficiency--a unit of skill, at a larger level than is generally looked at with detailed processing studies. After work on regularities at this mid-level, one could work down to the details of process and up to instructional studies. Work at this mid-level of analysis might be best characterized by what we are beginning to call "instructional experimentation."

Learning and Acquisition

I am concerned, as was Trabasso, about the omission or neglect of papers on learning and acquisition. With the exception of the paper by Holland on what responses are being controlled from an operant point of view, and the paper by Wallach, who had some notions about the learning

of transfer, there have been essentially no papers on the variables that influence learning and acquisition--no theory of acquisition. This probably reflects the emphasis of cognitive theories on describing performance and on describing development.

My guess is that when the big push comes to do a better job teaching the early basic skills of reading, and we look for the kind of learning principles to use, we will use what we already seem to know. This will be what we have learned about reinforcement in the S-R tradition and in the verbal learning tradition. However, we cannot describe complex competence very well with the tools of older S-R theories of learning. Information processing notions give us a better handle for describing performance. Perhaps eventually, the work on cognition, and particularly cognition in reading comprehension, will suggest not only what to teach, but how to do it, or how to design environments which better allow learning and growth to occur. But, at the moment, we must rely on what we know. We have not done much research on the acquisition of complex behavior. There is a need for this kind of research and for theories of acquisition of competence and skilled behavior (Glaser, 1976).

Learning to Learn

One of the things we have to consider is not only what experimenters do or teachers do about helping children to learn, but also the need for concern regarding learning-to-learn skills. By this I mean teaching a child to do for himself what a teacher or experimenter often does. This is suggested in part by studies of meta-cognition and self-reinforcement. It will be necessary to pay attention to self-acquisition skills,

the learning of learning skills, and how one modifies one's own environment for learning. These competences will be a big part of any concern with learning and acquisition.

Field and Classroom Research

The field research studies that were reported, for example, the work by Guthrie and Samuels and his colleagues, is important and the trends that these studies show must be accounted for. Their implications have already been presented by other discussants, especially the need to use and analyze new data that are collected in the framework of directed questions.

There are two further points that need to be made. One is the need for analytical models--models by which one can measure the nature of student characteristics coming into a program, the nature of student output, and the nature of the classroom differences. Then the variances attributable to the influence of these different factors can be assessed. Combined with Courtney's concern for the dynamics of the classroom process, these analytical models of the influences on achievement will be useful. These are beginning to be developed by Cooley and others (Cooley & Lohnhard, 1975; Cooley & Lohnes, 1976; Wiley & Harnischfeger, 1974), and some years ago, Carroll (1963) started a model which is still being talked about.

Another point that I think is very important in this kind of work on the dynamics of the classroom and field research data is some sort of framework in which to systematize the information obtained. Much survey

and field research collects data, but there is not an articulated framework or even a rough framework into which to put it. Some way is needed to store the information, and it seems to me that some kind of organizing scheme should be articulated by the people reflecting on these conferences, a scheme which helps collect the field data, and at the same time uses some kind of language which connects with theories of learning and cognition. If we could get some kind of a connecting language as a framework for collecting field information, and all you need as a start is some words that mean the same to different people, then we could begin to say, "Hey, you know, what is happening in this classroom reminds me of this theory in learning;" and these relationships can begin to be made.

Stages of Acquisition

Another need is a "levels of proficiency" theory, something like a stage theory. LaBerge talked about this need and the transition to the context nodes stages, and we need to emphasize this kind of work so that instructional theories and the acquisition theories can be formulated in terms of levels of competence--levels of increasing skill that we can look at.

Chall gave some notions about these levels in the first paper of the conference. She discussed the first as being decoding. Another stage is one in which an individual reads things he or she knows in order to confirm knowledge and in order to develop fluency in reading. A third stage is reading for new knowledge where one has to make contact with

his or her knowledge base and learn to connect old knowledge to new. Another stage is one in which reading is selective, critical, and reflective, and includes the kind of reading one does when he or she become very specialized. People learn to have one kind of text structure in mind when they read a novel and another kind of text structure in mind when they read a scientific article. At advanced stages, the reader is able to selectively use printed materials and to decide what to read in order to obtain knowledge of interest.

We need some kind of a crude stage model at the moment, and we can learn from the kind of stage theory that has been talked about in child development. My hunch is that the micro-genetic changes in skill learning are very similar to macro-genetic developmental changes. But at the moment, we need some beginning identification of these levels of proficiency.

As I said at the beginning of my remarks, we can and must move in heavily on teaching decoding skills. But, there is going to be a change in what we know about complex processing that is going to change the emphasis on teaching skilled readers. In the future, say 25 years from now when we know more, the emphasis will be on teaching skilled thinkers at the same time that we teach skilled readers. For the present, we are going to produce better skilled readers, and they are going to learn to think like we all have learned to think. As we learn more about information processing and develop theories of levels of proficiency, maybe we can make some inroads toward producing skilled thinkers at the same time we are producing skilled readers. That is the real

challenge of the future, although we should not give up the immediate challenge of getting people to be skilled readers.

I have little else to say, other than of therapeutic value. I want to console those who are discouraged by the amount of work left to do by showing that our problems are not ours alone. For this purpose, I would like to discuss a little book I received in the mail recently. It is called Acquiring Ball Skill (Whiting, 1969). The author begins by defining a ball: "The word 'ball', . . . [is] taken to stand for ball, shuttlecock, puck, etc." The book then discusses what psychologists know about acquiring skill in ball games. I am going to indicate what the state of knowledge is in that field since it has direct relevance to the major themes of the reading conferences.

The author writes, "There is no firm evidence that would allow it to be assumed that the establishment of a general 'pool' of ball/bat experience is necessary or desirable prerequisites to the acquisition of skill in a particular ball-game." He goes on to say that it is "difficult to produce objective evidence as to the most worthwhile early experience for potential ball-game players." Note the contrast to what is done in teaching beginning reading when he says, "It is not usually the object of educationalists to establish specific ball-game playing ability in very young children"(pp. 72-73). He says that it could be done but the current sympathy is to teach general ball/bat experience of a more general nature. In contrast, we try to teach very specific reading experience early.

The author then proceeds to ask: "How do people start off to acquire ball skill(s)?" He describes three methods used in the field. The first is "Comparatively free experimentation with a variety of striking implements (bats, racquets, clubs, etc.), balls and players in an attempt to exploit their potentialities in a wide variety of situations. Under such circumstances, the person performing would generally set the criterion of success, although particular objectives might be defined by the teacher/coach who also might give knowledge of results. This type of approach might well be used in the initial stages of ball skill experience previously discussed. In such a procedure, specificity of skilled action is usually less important than diversity of experience" (p. 73).

Technique two is "A development which precedes from the specific to the general. Ball games are broken down into a series of skills, sub-skills and tactical situations. These are then practised in isolation or in small groups and the game is gradually built up from the isolated skill level to the composite game. As progress is made, more complex skill sequences involving groups of players may be taken out of the game situation and practised as a unit with the idea that when later fitted back into the game there will be a carry over from the practice situation" (p. 73).

That was the bottom-up. The third technique is top-down--"an almost reverse procedure which progresses from the general to the specific. In this situation, the players are introduced to the game more or less

immediately, and specific skills are acquired during the game itself. Any coaching which takes place is always in the game situation and it is considered unnecessary to abstract patterns of play for practice in isolation" (pp. 73-74).

The author then dismisses the first method because in the present context its application is considered to be limited and states that the superiority of either the second or the third is yet to be established. "Both have their committed adherents, and both have resulted in the production of highly skilled games players. There have been few comparative studies between the two approaches and it is difficult to see how such investigations could be established with adequate controls" (p.74).

However, he says that, "If anything, there has been a discernible move towards methods which span those outlined in . . . [techniques] 2 and 3 such that skills considered to be too complex to be acquired during a game are practised in isolation while the more simple skills are acquired during play. It still must be recalled that when skills are learned outside the game situation itself, there is still necessity for experiencing the perceptual cues which are necessary for bringing . . . the action in to play at the right time" (p. 74).

Ergo, the ambivalence exhibited during our conferences exists elsewhere in the world, and perhaps there is really a straw-man debate about top-down versus bottom-up. Certainly both kinds of processing are involved--specific to general and general to specific--in the development of skilled performance. It is a function of individual differences in the learner, of teacher skills, and a combination of teaching techniques which result in the production of highly skilled players of the game.

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OPEN DISCUSSION OF GLASER PRESENTATION

GORDON: Bob, thank you. I always find it interesting and stimulating to listen to you. There is one issue that the conference has skirted which ought to be included as a central problem related to much that we have considered. It is the issue that Elsa Bartlett tried to nudge us toward. It has to do with the social context in which reading and all learning and development occur.

I contend that it may be that all of what we try to do could amount to relatively little, if done in a context that is so destructive to what we are trying to do, that it's impossible to overcome it. The specific situation and the general context in which reading is learned are too important to ignore.

The other observation I want to make is that maybe we have to give increased attention to the ways in which what we do on the technical sides interacts with that social context, limits it or to some extent facilitates it, and maybe even gives specificity to the limits of what we can do. When you revise your notes, I hope you will go back and introduce some of that concern, particularly since the target population is one that is so negatively influenced by the social context of their learnings.

GLASER: There is an articulation of systems. There is the scientific system, the educational system, the policy-making system, and there is the social inequity system. And they all impinge upon what we can do, and how one operates on all of these levels takes someone as wise as you to say. There are some systems we just ignored in this conference. Elsa impinged upon it a little bit, but there are some systems we ignored and you say that those systems have to be addressed.

GORDON: I am saying, Bob, that we can't afford to ignore them, because for example the best teaching strategy gets influenced by the actions of the teachers' union. The best designed program is in critical ways influenced by the distribution of power and resources of a society. If we fail to recognize these overlapping systems, and the ways in which they either facilitate or interfere with what we do, I think we limit our understanding of what we do.

MacGINITIE: The best teaching system may depend upon the particular social system that is operating in a particular microcosm at a particular time. It is easiest to see, for me, in relation to the bilingualism issue that was raised yesterday. There, we tended to speak of the context, the present political context, as limiting the kind of research that we can do. Only certain kinds of programs can be installed in certain situations. Whether the parents of a particular child, or the adults in a particular community are also trying to learn English, would be an example of one variable that should influence whether one system or another would work best in that situation.

McCONKIE: Bob, you acted almost surprised that most of the papers seemed to focus on decoding. I think the answer is obviously because it was a conference that dealt with beginning reading, and that's what is perceived as the primary task of beginning reading.

I specifically choose not to talk about research we have done on what aspects of the test people tend to remember, and what little we have been able to find out about comprehension processes at higher levels, because that didn't seem to be the focus of this conference. There is no surprise, given the topic, that that is what most of the papers focus on.

GLASER: You are right, George. But I also believe that if one looks at the literature over the past 10 or 15 years, that most of the practical work we have is on the lower levels. With the recent emergence of work on comprehension, we must work to get some approaches to understanding it. The difference is that decoding is really for exploitation, and comprehension is only ready for scientific explanation.

SUPPES: I wanted to comment, because I am very much in agreement, broadly with what you said about instructional systems and design of instructional systems. We really haven't done very much about that yet. One of the things that has been a problem in instructional design is that the research has focused so much on the micro level, and when the micro level is translated into instruction, it tends to give a very rigid format for the presentation of the curriculum. In actual fact, I would predict that much of the fruitful work on instructional design, bringing to it psychological knowledge, will be at the global level, and we will leave a lot of freedom to the individual curriculum designer at the level of what particular kind of items to introduce into the curriculum, to achieve a broad objective.

We need to go to the global design questions. I recently looked into the elementary school curriculum, for quite apart from any psychological insight, simply broad systematic disoussions of how should time be allocated, what should be accomplished in reading, in mathematics, in language arts, in the second grade or the third grade. And what I found remarkable is the absence of intellectual discourse about that problem. What is missing is more global thinking about the overall allocation across the school year, or across several years. And I hope that what you are suggesting about instructional design will lead to much more serious consideration of those problems of allocation than we yet have.

GREGG: I am sympathetic to the idea of an intellectual discussion about the trade-offs and time parameters and the like, but I don't think that's what the teachers need. One of the failures, if we can think of it as this conference, has been that we haven't brought many of the global ideas down to a level that a teacher could make a diagnosis about what part of the system, decoding or comprehension, is wrong. Not all teachers can make diagnoses of specific problems.

SUPPES: I have something much more in mind than intellectual discussions, because I am really one of the veterans of the classroom. I agree the teachers will still be faced with the problems, but it is a problem for curriculum people.

GREGG: Incidentally, until this conference, neither of the other meetings brought in the idea of time at all. I don't think there was a single paper that addressed the issue of how much learning goes on in a time period.

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